

IND 511 Advanced Engineering Economy**(3 hours/week) Fall 2010****Instructor:** Prof.Dr. E. Ertuğrul Karsak**E-mail:** ekarsak@gsu.edu.tr**Office hours:** Thursday 4:00-5:00 pm and with appointment

Week Nr.	Topic	Texts
1	- Introduction and organization - Review of discrete cash flow models - Uniform and gradient series - Nominal versus effective interest rates	P&S Ch. 2.1, 2.2, 2.3, 2.4; FL Ch. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7
2	- Continuous compounding and continuous cash flows - Mid-period convention - Time-dependent interest rates - Loans - Laplace, Z and Mellin transforms in cash flow modeling	P&S Ch. 2.5, 3; FL Ch. 2.8, 2.9, 2.10, 2.11, 2.12; Notes
3	- Equivalent methods for comparing alternatives (single project) - Present worth, future worth and annual worth methods - Benefit-cost ratio method - Rate of return method and variations - Internal rate of return method - External rate of return method	P&S Ch. 6.1, 6.2, 6.3, 6.4; FL Ch. 3, 4; Notes
4	- Decision rules for selecting among multiple alternatives - Present worth, future worth and annual worth methods - Benefit-cost ratio method - Internal rate of return method - Approximate and supplementary methods - Payback method - Profitability index	P&S Ch. 6.5, 7.2, 7.3; FL Ch. 3, 4, 5
5	- Depreciation methods - After-tax economy studies	P&S Ch. 4.3, 4.4; FL Ch. 6.2, 6.3, 6.4, 6.5, 7.3, 7.5
6	- Index numbers - Incorporating inflation into economic analysis	P&S Ch. 2.7; FL Ch. 11; Notes
7	- Replacement models - Retirement with identical replacement - Generalized replacement model - Dynamic programming formulations	P&S Ch. 16; FL Ch. 8; Notes
8	- Mathematical programming formulations for capital budgeting - Use of linear programming models - Use of dynamic programming	P&S Ch. 8.2, 8.5; Notes
9	Midterm exam	
10	- Risk analysis - Statistical moments of random variables - Random cash flows - Random project life	P&S Ch. 10.2, 10.3; FL Ch. 10.3
11	- Decision criteria and methods for risk and uncertainty	FL Ch. 10.4, 10.5
12	- Fuzzy discounted cash flow analysis	Notes and Papers
13	- Introduction to real options approach - Project presentations	Notes TBA
14	- Project presentations	TBA

Texts

Park, C.S., Sharp-Bette, G.P., *Advanced Engineering Economics*, John Wiley & Sons, 1990. (placed on reserve in GSU Library)

Fleischer, G.A., *Introduction to Engineering Economy*, PWS Publishing Company, Boston, 1994. (placed on reserve in GSU Library)

Lectures are not aimed to merely repeat the readings assigned from the textbooks. They are designed to supplement the assigned readings. Supplementary readings will be assigned from time to time, especially from the journals devoted to the problems of capital investment such as *The Engineering Economist* and *International Journal of Production Economics* (both available in GSU Library).

Semester grades will be determined on the following approximate bases:

Midterm exam	30%
Project*	20%
Final exam	50%
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	100%

* Each student should select a topic from the list given below and identify 1-2 recent references (publication date not prior to 2007) on the topic. Then, each student is expected to write an approximately 15-page article on the selected topic (most likely after supplementing his/her research with some older references). He/she is encouraged to perform some developments on the models presented in the references or at least apply the models to different numerical examples. Each student will present his/her study during the last two weeks of the semester. Not more than two students may select the same topic.

List of Topics

Capital budgeting
Cost of capital
Lease-buy decisions
Mathematical programming in capital budgeting
Consideration of multiple objectives and criteria in analysis
Fuzzy cash flow analysis
Rate of return method (IRR, ERR)
Benefit-cost ratio method
Payback method
Replacement analysis
Production economics
Economic evaluation of advanced manufacturing systems
Forecasting economic consequences
Inflation
Sensitivity analysis
Risk analysis
Stochastic models
Real options
Energy economics
Economic aspects of waste management